

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for identifying objects in a digital image included in a sequence of images, comprising the steps:

comparing luminance values of a current digital image with at least one threshold value in order to create, on the basis of the comparison, a current binarized image;

calculating a quality measure for the current binarized image; and

updating, on the basis of said quality measure, said at least one threshold value for use in binarization of a subsequent image,

wherein said steps are included in a control loop, each iteration of the control loop comprising:

retrieving the current image;

estimating a contrast distribution of the current image;

calculating said at least one threshold value, based on said contrast distribution and a contrast depth factor calculated during a preceding iteration;

creating the current binarized image on the basis of said at least one threshold value;

calculating the quality measure of the current binarized image;

calculating an error between a set value and the quality measure; and

calculating a new contrast depth factor based on the preceding contrast depth factor and said error, and

wherein the control loop operates with essentially constant poles.

2. (Cancelled)

3. (Currently amended) The method as claimed in claim 1, wherein said at least one threshold value is associated with at least one partial area of the current image, wherein said at least one threshold value is updated on the basis of an object luminance value and a background luminance value defined by said at least one partial area of the current image.

4. (Currently amended) The method as claimed in claim 3, ~~in which~~ wherein said ~~at least one threshold value is updated on the basis of~~ at least one contrast depth factor, ~~which~~ indicates the relative position of the threshold value between the object luminance value and the background luminance value.

5. (Cancelled)

6. (Original) The method as claimed in claim 5, in which the quality measure is calculated for control partial areas of the current binarized image, and in which the contrast depth factor is determined for each of the control partial areas.

7. (Original) The method as claimed in claim 1, in which the quality measure represents the area of the objects in the current binarized image.

8. (Canceled)

9. (Canceled)

10. (Currently amended) The method as claimed in claim 81, wherein said control loop is based on a model function relating the quality measure to the preceding contrast depth factor, wherein said method further comprises: intermittently adjusting the model function to a current operation condition, so that the control loop operates with essentially constant poles, independent of operation condition.

11. (Currently amended) The method as claimed in claim 81, in which the control loop is based on a model function which relates the quality measure to the preceding contrast depth factor, which model function includes at least one model function operating point which is essentially common to all digital images in the sequence of images, the step of calculating a new contrast depth factor comprising the step of parameterizing the model function on the basis of the preceding contrast depth factor and said model function operating point.

12. (Original) The method as claimed in claim 11, in which the parameterizing of the model function includes setting the quality measure equal to the set value.

13. (Original) The method as claimed in claim 11, in which the parameterizing of the model function is further based on the quality measure which has been calculated for the current binarized image.

14. (Original) The method as claimed in claim 10, in which the model function is defined at least around the set value.

15. (Original) The method as claimed in claim 10, in which the model function is a linear function.

16. (Original) The method as claimed in claim 11, in which the model function is defined at least around the set value.

17. (Original) The method as claimed in claim 11, in which the model function is a linear function.

18. (Currently Amended) The method as claimed in claim 911, in which the control loop is given by:

$$\begin{cases} k(n) = k(n-1) + \alpha_1(n) \cdot (e(n) - e(n-1)) + \alpha_2(n) \cdot e(n) \\ e(n) = w - Q(n) \\ \alpha_1(n) = \beta_1 \cdot \frac{k(n-1) - k_d}{Q(n) - Q_d} \\ \alpha_2(n) = \beta_2 \cdot \frac{k(n-1) - 1}{Q(n) - Q_d} \end{cases}$$

where k is the contrast depth factor; w is the set value, Q is the quality measure; n is the iteration number; β_1 , β_2 are constants; and k_d , Q_d are the values of the contrast depth factor and the quality measure, respectively, at said model function operating point.

19. (Currently amended) The method as claimed in claim 81, comprising the step of intermittently updating the set value on the basis of said quality measure.

20. (Currently amended) The method as claimed in claim 81, comprising the step of intermittently updating the set value on the basis of the contrast depth factor.

21. (Original) The method as claimed in claim 1, in which said comparison is effected on the basis of a threshold matrix containing a plurality of said threshold values, each threshold value being designated for a respective partial area of the current image.

22. (Currently Amended) A device which identifies objects in an image, comprising at least one processor having logic configured to binarize a sequence of temporally distinct digital images, refine over the sequence of temporally distinct images at least one thresholding parameter utilizing a feedback control, and

obtain a set value in the form of a quality measure of the images after the binarization, wherein each iteration of said feedback control comprises:

retrieving a current image;

estimating a contrast distribution of the current image;

calculating said at least one threshold parameter, based on said contrast distribution and a contrast depth factor calculated during a preceding iteration;

creating a current binarized image on the basis of said at least one threshold
parameter;
calculating the quality measure of the current binarized image;
calculating an error between a set value and the quality measure; and
calculating a new contrast depth factor based on the preceding contrast depth
factor and said error,
wherein the feedback control is configured to operate with essentially constant poles.

23. (Previously presented) A computer program product which is readable in a unit provided with a processor and comprises a computer program with instructions for causing the unit to carry out a method according to claim 1.

24. (Currently amended) A hand-held apparatus for position determination, comprising a sensor for producing a sequence of images of a surface with a position-coding pattern, and a processing unit which is provided with a processor and is adapted to calculate a position on the basis of the position-coding pattern in the image, the processing unit comprising a computer program product according to claim ~~22~~23.

25. (Currently Amended) A device for identifying objects in a digital image included in a sequence of images, comprising a control system including:

segmentation means which is adapted to retrieve at least one threshold value and compare luminance values of a current digital image with said at least one threshold value in order to create a current binarized image on the basis of the comparison; and

control means which is adapted to calculate a quality measure for the current binarized image and, on the basis of the quality measure, to update said at least one threshold value;

wherein said segmentation means is adapted to retrieve the updated threshold value for use in binarization of a subsequent image,

wherein said control system further includes a control loop, each iteration of the control loop comprising:

retrieving the current image;
estimating a contrast distribution of the current image;
calculating said at least one threshold value, based on said contrast distribution
and a contrast depth factor calculated during a preceding iteration;
creating the current binarized image on the basis of said at least one threshold
value;
calculating the quality measure of the current binarized image;
calculating an error between a set value and the quality measure; and
calculating a new contrast depth factor based on the preceding contrast depth
factor and said error.

wherein the control loop is configured to operate with essentially constant poles.